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INST develops unique drug delivery method to improve treatment of brain tuberculosis

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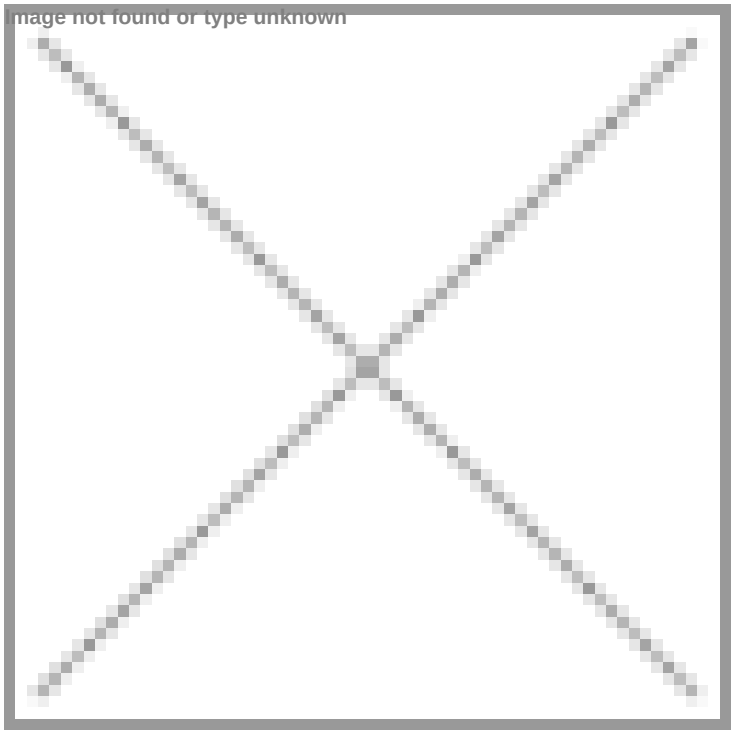
Nasal delivery of nano-aggregates reduced the number of bacteria in the brain by nearly 1,000 times more than in untreated mice



Researchers at the Institute of Nano Science and Technology (INST), Mohali, an autonomous institute of the Department of Science and Technology (DST), have created a unique way to deliver Tuberculosis (TB) medicines directly to the brain bypassing the challenging blood-brain barrier (BBB) that limits the effectiveness of many brain TB medicines.

This innovative drug delivery method can effectively treat brain TB, a life-threatening condition with high mortality rate.

Traditional treatments involve high doses of oral anti-TB drugs, but these often fail to achieve effective concentrations in the cerebrospinal fluid due to the blood-brain barrier. This limitation underscored the need for more effective delivery methods that can target the brain directly.

Scientists at INST used tiny particles made of a natural material called chitosan, to deliver TB medicines directly to the brain through the nose, bypassing the BBB.

The drug delivery technology used was nose-to-brain (N2B) drug delivery, which utilises the olfactory and trigeminal nerve pathways in the nasal cavity to bypass the BBB. By delivering the drug through the nasal route, the nano-aggregates can

transport the drugs directly into the brain, significantly improving drug bioavailability at the infection site.

Besides, chitosan is known for its mucoadhesive properties, and sticks to the nasal mucosa, which helps the nano-aggregates stay in place and prolongs the time they can release the drug, enhancing its therapeutic effectiveness.

It could be applied to treat other brain infections, neurodegenerative diseases (like Alzheimer's and Parkinson's), brain tumours, and epilepsy by enabling efficient drug delivery to the brain.